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Reinforcing the Military in Military Medicine:

Driving a Cultural Change in Investigating, Tracking and Training

to Prevent Patient Safety Events in Military Facilities

By

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ABSTRACT

Patient safety within military medicine has long been framed by trends and methods developed in civilian health care. Though several aspects of military safety processes could be leveraged to improve patient safety investigations, event tracking, and prevention training, these measures are not currently employed in military medicine. This paper will examine how using the current military safety framework and civilian patient safety techniques can improve the quality of patient safety reporting, provide improved trend analysis, increase lessons learned in patient safety events, and improve communication and teamwork training such as TeamSTEPPS. It will further recommend future consolidations that may make patient safety more effective in military medicine.

Introduction

Civilian medical experts have long worked to identify serious errors resulting in patient death and injury. Despite subtle differences between civilian and military medical care, military health care currently uses civilian medical safety standards and event investigation procedures. This method may provide a majority solution for a strong patient safety program. Additionally, aviation safety program successes have provided models for patient safety improvement.

Several techniques in military safety investigations and developments in civilian patient safety investigations could improve the safety of military health care. Examples include the use of independent investigators, major command review of completed investigations, and large databases for trending and tracking errors and mishaps. Additionally, technology and current existing data collection processes can be maximized by the use of "trigger points" to identify unreported events and provide better trend analysis. These measures have improved event reporting, ensured lessons learned are collected, and enabled better training to prevent future similar occurrences in each of the disciplines in which they have been applied. While critics of this idea may claim military medicine is too specialized to allow outside safety investigators and a strong near-miss reporting system, many benefits have been seen in the aviation and maintenance communities as a result of these methods, despite each community's initial reluctance to implement such programs.

Many safety experts have postulated that safety in hospital settings could be improved by applying techniques similar to those used in transportation safety programs (Wachter, 2008). Patient safety improvement resources focus on problems based on the safety rates of similar civilian or military medical facilities, and error mitigation strategies based on generalized trends within civilian medical institutions (US Dept of Health and Human Services). Civilian estimates

hold that medication errors, one aspect of patient safety, result in 1,000 more deaths per year than Americans killed in workplace injuries (Kohn, Corrigan, & Donaldson, 2000). In in-patient care alone, preventable medication errors are believed to cost about $2 billion nationwide (Kohn, Corrigan, & Donaldson, 2000). These numbers do not adequately address what happens to patient care when patients lose trust in their health care providers. Lost trust is incalculable.

Current USAF safety directives do not include patient safety. Perhaps this is because of the perception that specialization is required to investigate events, report trends, and enact prevention measures (Air Force Instruction 91-202 (Change 1), 18 February 2010). This leaves patient safety event investigation and prevention solely in the hands of the medics themselves. Because we are relying on the experts to assess their own problems, culture change has been slow-- a problem identified in civilian institutions as well (Nance, 2008). The current military safety framework can improve the quality of patient safety reporting, provide improved trend analysis, increase lessons learned in patient safety events, and improve communication and teamwork training such as TeamSTEPPS. These measures are necessary to improve the culture of safety within USAF military medicine. Patient safety concerns should be investigated as thoroughly as any other military mishap; they are not by nature excluded from the requirement to understand what happened and to prevent future occurrences.

Critics of the combination of military and patient safety disciplines argue that medicine is too specialized or that the cost of becoming a medical provider or losing one's license justifies exclusion of a detailed analysis of medical error. This paper also will show that these challenges are not significantly different than those seen historically in the aviation or occupational safety disciplines which can make medical operations safer.

I. What We Already Know About Patient Safety (Background)

The importance of patient safety cannot be understated. Medics are charged with the most important task imaginable, helping others in their most dire time of need. Often, this occurs when patients are most vulnerable. The trust required between a patient and his health care provider has been a sacred bond from time immemorial. Current patient safety initiatives seek to retain that trust. Also, increasing medical knowledge allows for medical providers to tackle difficult health care challenges that were historically certain death sentences. A common ideal for patient care comes from the Hippocratic Oath, admonishing medics to "first, do no harm" (Wachter, 2008). This lofty goal is enabled by efforts to understand the implications and failures in previous medical care. Thus, patient safety was born.

Terminology is one important point in patient care. Many patients can become sicker or die as a result of their medical conditions. To successfully identify trends in patient safety, one must be able to distinguish between patients that received care with errors, care that is less than an accepted medical standard, and/or care that had no effect on the eventual outcome. Because of this distinction, harm resulting from medical care is typically labeled an adverse event and outcomes with harm resulting from a natural disease course being labeled morbidity/mortality outcomes. The adverse events that result from errors during patient care are typically termed preventable adverse outcomes (Wachter, 2008). Preventable adverse outcomes that fall below a certain standard of care can create legal liability in some health care models, but this is not the case in military care because an active duty member cannot sue the government (Pitts, 2009). A comparable analogy for non-aviators might be if the aircraft landed, then surely a safe flight occurred. Anyone familiar with flight operations knows this is not necessarily true!

Patient safety has undergone a massive change in the last two decades. In 1999, a revolutionary report by the Institute of Medicine (IOM) titled "To Err is Human" introduced the idea that human error exists within the medical community in a similar manner as seen in other complex operations. The report details a myriad of preventable errors that should inform health care providers. Medical reformers rallied around the idea that some 98,000 people die per year as a result of preventable medical errors and set a goal of 50% error reduction over the subsequent five years (Kohn, Corrigan, & Donaldson, 2000). Another important impact of the report was errors were identified in virtually every aspect of patient care: large numbers of medication errors, operating room errors, Intensive Care Units (ICU) communication gaps, and even errors in discharging patients (Wachter, 2008).

In essence, the IOM report quantified the cost of human error in medicine. James Reason is a noted expert on human error. He writes,

> "The problem with errors is not the psychological processes that shape them, but the man-made and sometimes unforgiving workplaces that exist within complex systems. There are two parts to an error: a mental state and a situation. States of mind like moments of inattention or occasional forgetfulness are givens, but situations are not. And situations vary enormously in their capacity for provoking unwanted actions. Identifying these error traps and recognizing their characteristics are essential preliminaries to effective error management" (Reason & Hobbs, 2003).

Critics may argue that the IOM report did little more than provide a wake-up call to the dismal state of patient safety in 1999 and identify that adverse outcomes were more than simply the result of a poor medical care. At its most basic level, the IOM report opened a dialogue among health care providers on how to improve medicine by focusing on organizational change over

efforts to find the right individual to blame. A direct result was seen in increased patient safety articles and money toward patient safety research in the five years following the report's release (Stelfox, Palmisani, Scurlock, Orav, & Bates, June 2006). Proving fewer adverse outcomes resulted from increased patient safety initiatives is much more challenging because it requires a provider to admit an error in a culture that does not currently encourage such reporting. One such report by a surgeon who released a public apology after wrong site hand surgery gained national attention as a result of his effort to aid others not "to make the same mistake I did" (Aleccia, 2011).

Reporting and tracking an event in which the adverse outcome was not obvious or was later resolved is a complex process, rife with potential for human error. Simply identifying which events to track can be problematic. Patient safety data can be collected via several means. Voluntary error reporting is one method. Another is reviewing a sample of medical charts, a time and labor-intensive process that is heavily influenced by hindsight. Finally, use of systemic triggers can provide information on possible events, such as a patient being re-admitted within a certain time window or requiring increased care. These triggers may identify events which do not actually reflect errors (Wachter, 2008).

Currently, adverse events are tracked within the military medical system. These events are most commonly reported via a voluntary self-reporting system, though patient safety committee members or other interested medical providers can request a review of care within the Medical Treatment Facility (MTF) (White, 2011). After receiving the report, an investigator is appointed by the Patient Safety Manager. The investigator completes an investigation and provides information on causes to a patient safety committee who are responsible for tracking trends and advising senior medical leaders on patient safety events within the MTF (White, 2011). When

warranted per The Joint Commission (TJC) guidelines or safety committee concerns, a Root Cause Analysis (RCA) is accomplished. Adverse events that are "an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof" are considered Sentinel Events by TJC (The Joint Commission, 4). These are required to report through MAJCOM levels per AF instruction.

These events might be perceived as equivalent to what military Safety considers a Class A mishap, which is equivalent to $2 million in damage, a fatality, or destroyed aircraft. Similarly, an RCA is intended to be an in-depth investigation similar to what is accomplished via a Safety Investigation Board (SIB). TJC provides a standard investigation framework and tracks RCA reports that are submitted to them. There are currently no lower level TJC equivalents to Class B, C, D or E mishaps for comparison. Also in contrast to military safety investigations, there is no school which trains medical investigators on how to accomplish and report their findings.

Additionally, a MAJCOM/SG review is only mandated in the case of an RCA investigation (Air Force Instruction 44-119, 24 September 2007). AF instructions direct the Patient Safety Manager "notify the chain of command" about adverse or sentinel events and that analysis of near misses and actual events will be in accordance with DoD Patient Safety Program guidance (Air Force Instruction 44-119, 24 September 2007). The MTF commander is given wide latitude in determining if an event is likely to recur and assuring that the RCA team has the leadership and clinical expertise to review the processes and systems surrounding the event (Air Force Instruction 44-119, 24 September 2007).

It is quite common for health care organizations to rely on voluntary self-reports of error. Voluntary reporting of 'near misses' is encouraged by the IOM report because it helps identify system vulnerabilities before harm occurs or illustrates patterns of error that point to systemic

issues (Kohn, Corrigan, & Donaldson, 2000). Because almost all accidents were the results of human error, usually induced by faulty systems, the institution holds responsibility to redesign its processes for safety (Kohn, Corrigan, & Donaldson, 2000).

An incident reporting system may be computerized or completed with pencil and paper. Voluntary reporting methods are fraught with problems: nurses tend to report more frequently than doctors, informal channel reports may not be documented, and reporting is influenced by more than the number of errors (Wachter, 2008). These problems can potentially be mitigated through several measures discussed in this paper.

An organization with a strong safety culture or an expensive computer database may see an increase of reports because of the leadership's focus, rather than an actual increase in errors. This is called the Hawthorne Effect, which results when subjects change their behavior as a result of being studied rather than because of the experimental conditions as seen when hand-washing increased 65% simply as a result of hand hygiene observers (Kohli, Ptak, Smith, Taylor, Talbot, & Kirkland, 2009). It should be clear that a program solely reliant on voluntary reporting may not provide optimum data; one study found that voluntary self-reporting identified 1 in 500 adverse drug events but a combination of chart review and computer screening found 1 in 10 (Wachter, 2008). Failures in self-reporting should be examined, especially if voluntary reports are the primary method of information gathering used.

Many reasons can cause people to fail or become reluctant to report events: medical liability and fear of lost licensure, perceived inevitability of patient's outcome, personality factors, cultural habits, and the complex nature of health care operations resulting from team efforts. Concerns about medical liability from medical malpractice lawsuits generated the early 1990s efforts in patient safety improvement, resulting in the majority of patient safety articles prior to the 1999

IOM report detailing malpractice (Stelfox, Palmisani, Scurlock, Orav, & Bates, June 2006). Today, those concerns remain and continue to haunt investigations as blame is easier to assign to one individual than to evaluate the layers of an organization for failures.

Medical malpractice fears lead to a second major concern, loss of licensure. Some experts have estimated that one or two malpractice suits occur for every hundred injuries (Agency for Healthcare Research and Quality, 2010). This is significant because some medical providers study for over eight years to reach a fully-qualified status in their specialty. A loss of licensure may result in an inability to repay hundreds of thousands of dollars in student loans. This financial consideration alone may be enough to discourage self-reporting of adverse outcomes, but others factors combine with it to result in a culture that has not successfully overcome reluctance to publicly identify errors. One recent study found 16% of surgeons who had a recent major medical error reported contemplating suicide, citing fear of losing their jobs as a contributor in their reluctance to seek mental health treatment (Tanner, 2011).

Reporting is also hindered by the perceived inevitability of an outcome. This notion may render a provider reluctant to report, as they may believe a patient was going to die, lose a limb, or suffer from the adverse outcome regardless of the provider's efforts. Modern medicine and technology have turned many diagnoses from terminal to treatable ones. Examples include catheter-related blood infections or ventilator-related respiratory diseases (Wachter, 2008). Awareness of technology paired the multitude of medical dramas permeating television can result in a patient's family with unrealistic assumptions about recovery, predisposing them to litigation if an outcome they did not expect occurs. Add this notion to uncertainty about liability or that other care providers may feel a patient was terminally ill, a provider concerned about suffering financial and personal ramifications may have low motivation to report their error caused or

hastened a patient's adverse outcome. These factors are clear problems to an open-reporting culture, but they are not the only hindrances.

Adverse personality factors have long plagued medical and other high-risk professions. These professions require an individual with the ability to rapidly make decisions without questioning their own judgment who can lead a team to a selected final outcome. Medical professionals must accomplish several tasks: complex decisions and other conscious behaviors; customer-type interactions; and a multitude of automatic activities while under pressure to a high degree of required accuracy (Wachter, 2008). Rigid hierarchies may develop as a way to manage risk or maintain situational control and clarify decision-making authority.

Within rigid hierarchies, cultural habits can develop resulting in failure or reluctance to report errors or adverse events. Leaders may have become so closed to team input that information is withheld from them or they are only told what team members believe they want to hear (Wachter, 2008). This can result in limited joint accountability during decision-making processes. Team members may feel they do not have an active role in patient care because they are simply executing orders or work for team leaders reluctant to listen to their input (Sexton, Thomas, & Helmeich, March 2000). One study showed that nearly 80% of surveyed surgeons felt that teamwork in their operating room was good, but less than half of the anesthesiologists, nurses, or residents agreed (Sexton, Thomas, & Helmeich, March 2000).

More significantly, the same study found that less than 5% of pilots and nearly 50% of surgeons agreed with the statement that "The beliefs of the leader should not be questioned" (Sexton, Thomas, & Helmeich, March 2000). These study results alone evidence that cultural barriers develop as a result of personalities commonly seen in medicine. As with modern aviation, modern health care may rely on decisions made within a few seconds leading to the

perception that adequate time to seek and coordinate opinions from all team members involved does not exist. More often than not, this is a culturally learned behavior rather than assessment of fact as numerous types of team training have identified methods by which teams can proactively or quickly communicate without compromising patient care.

Finally, failure to accurately report patient safety events can also result from the complexity of modern health care operations. Where one facility may be committed to identifying patient safety errors, medical providers providing referral services may not be under the same ethical constraints and elect not to participate in what may be perceived as or become a fault-finding investigation citing patient confidentiality constraints. If patient safety experts do not pay careful attention to the typical patient population, it is possible to misinterpret comparison data between organizations. One hospital with higher adverse outcome rates may simply have accepted patients with more complicated or advanced diseases than the first hospital because of higher levels of care that it can provide. The IOM report identified that "decentralized and fragmented" nature of the health care delivery system contributes to unsafe situations; access to patient information can be severely limited as patients see multiple providers in different settings (Kohn, Corrigan, & Donaldson, 2000).

In addition to reporting failures, it can be difficult to effectively identify how teamwork failed. When limited time and funding can be dedicated to training, modern medical leaders often select improving technical skill over teaching "common sense" team skills. These organizations may unintentionally devalue team skills such as good situational awareness, communication, and group decision-making. Teamwork training can offset cultural learning occurring as an unintended result of organizations that highly value individual technical skill and academic knowledge. The DoD and the Agency for Healthcare Research and Quality coordinated to

develop supplemental training on communication and teamwork skills called Team Strategies and Tools to Enhance Performance and Patient Safety, also known as TeamSTEPPS (Agency for Healthcare Research and Quality). TeamSTEPPS training is effectively human factors error prevention training and teaches communication, team coordination and decision-making, and other important team skills (Agency for Healthcare Research and Quality). Similar programs exist for aviators and are often called Crew, or Cockpit, Resource Management in military aviation. These programs are widely credited with reducing the overall severity of aviation accidents widely reported in popular media.

Current research into why a medical provider may be reluctant to report their part in a poor patient outcome is only one part of an integrated effort to improve patient safety. Human factors have long been recognized to have an impact in medicine. Many of the identified problems in patient safety are addressed via human factors training. To further improve the system, we must ensure that medical human factors training programs evolve to mitigate current patient safety trends. These trends should be identified via quantifiable data tracked at a headquarters or senior leader level, not based on a patient safety manager assumption. Clearly, additional assessments of the military patient safety process as it currently exists are needed to determine if all measures are being adequately employed to ensure military patients receive care without undue harm.

II. Are We Getting It Right: Do Deficiencies Exist in Current Patient Safety Processes?

Military medicine is already responsible for some of the great strides in medicine. Development of TeamSTEPPS training may not have occurred without the Executive directive resulting from the 1999 IOM report (Agency for Healthcare Research and Quality). Current military patient safety efforts are heavily dependent on civilian models and statistics. These models may not be as comparable as assumed. There are significant differences that must be

acknowledged between civilian and military medicine: liability, technology, and chain of command.

First, liability: military medical providers do not face the same concerns about liability as civilian care providers. The Feres Doctrine restricts members of the military from suing the federal government for injuries incidental to their service, citing the challenge to good order and discipline (Pitts, 2009). This is an important distinction between military and civilian medical providers and should be considered when examining patient safety reporting motives in a system that is heavily dependent on voluntary reports. Research does not appear to exist that compares military to civilian voluntary reporting rates.

As previously discussed, research has shown that voluntary reporting only identifies a small percentage of errors that occur. Reason cites four simple reasons that events may not be reported: a natural disinclination to ridicule, fear that reports will go "on the record" and count against us in the future, skepticism that reporting will have an impact, and the belief that too much time or effort will be required to report (Reason & Hobbs, 2003). Thus, ways to supplement voluntary reports must be made. Effective chart or peer case reviews will additionally find errors and has already been implemented in military medicine. However, reviews are a manpower intensive requirement in an already undermanned system. To minimize the impact, technology can be used to complete this additional workload.

Second, military medical technology is widely recognized as a benchmark for civilian hospitals. Fewer than 2% of US hospitals and 17% of medical doctors have adopted fully electronic medical records, contrasted with 89% in Britain (Mason, 2009). In contrast, President Obama has identified military health care information technology to serve as the "template for the rest of the country" in developing electronic medical records and prescription services, and

provided $19 billion in the February 2009 economic stimulus package (Mason, 2009). The widespread, mandated use of technology in military medicine allows for patient safety advocates to look for technological solutions to identifying when errors have occurred, so that training can be implemented to minimize recurrence of similar events. To aid this, the third significant difference between military and civilian providers, the chain of command, becomes an asset to be leveraged.

Last, the military chain of command is an important cause of action within military medicine. Though we lack the risk of liability, fear of disappointing senior leaders within the chain of command can replace some of the fear of liability in reporting. Additionally, military medicine can be more lucrative than civilian practice when governmental benefits, such as a pension, student loan relief, compensation for certifications and training, and near-guarantees of promotions and pay raises are considered. A military medical chain of command retains the right to balance its training and scheduling requirements so that patients have access to medical appointments and the staff remains adequately trained. Business cases for each MTF are regularly reviewed, ensuring providers generate the clinic access needed to prevent wasted funding. This same discretion is leveraged to emphasize training, such as TeamSTEPPS. However, training would be more effective if information on recent adverse events were regularly included.

Currently, military medical professionals rely heavily on civilian foundational training for patient safety. Civilian institutions can be inconsistent in teaching and applying effective patient safety techniques. Military providers are mandated to maintain certain reporting and training standards by their chain of command up to the USAF Surgeon General. Within a civilian institution, these guidelines are usually set by a patient safety committee or the hospital's

executive administration staff. While a hospital may have a strong patient safety program, they are not mandated to do so. Instead, accreditation is used as a method to encourage participation in a patient safety program as defined by TJC, a health care accrediting body. Failure to be or remain accredited may affect Medicaid eligibility status, depending on the state laws. Obviously, this would have significant financial impact on any of the some 17,000 TJC-accredited organizations (The Joint Commission). The result can be a piece-meal effort at consistent patient safety that consists of conforming to minimum standards rather than proactive safety.

Efforts to coordinate action, and share "best practices" have been increasing through TJC's Sentinel Events Alerts and other publications as well as efforts by the Agency for Healthcare Research and Quality (AHRQ). For example, one recent AHRQ webinar discussed an organization that provided human factors training to providers in 2006. In early 2009, incidents started to reappear, but the vendor who developed the initial training was not able to provide expanded training to minimize trends (Agency for Healthcare Research and Quality, 2010). They found that initial "training in human factors and the use of checklists are very effective approaches," but felt they needed an improved program which was intuitive and easily internalized, could self-sustain through a train-the-trainer process, and was based on rigorous testing and results was needed (Agency for Healthcare Research and Quality, 2010).

Yet, these civilian foundations develop the ideas by which a military medical provider learns to provide medical care. Interestingly, a culture is commonly defined by what it does. If the institution placed a high regard on patient safety, then presumably the provider would place a higher concern on reporting and reducing error. Providing TeamSTEPPS training can serve as a method to balance the inequity of civilian training in emphasizing error reporting and investigation. Changing the organization's practices to increase effectiveness has a significant

impact on bringing people's values and beliefs in line with a safer and stronger reporting culture (Reason & Hobbs, 2003).

But this massive effort requires active buy-in by military medical leaders at all levels and a strong reinforcement that patient safety, not simply meeting a business plan, is the primary objective when providing care. The financial perspective can be clouded by poor understanding of the true cost of adverse events. On study showed that in a review of toxic digoxin reactions, only 13 patients were affected, but treatment costs increased $57,000 higher for patients with the toxic reactions than those without (Opus Communications, 1999). Many hospitals without thorough patient safety trend reviews could simply attribute the increased cost of those "sicker" patients' care without investigating if the increased care was a result of an adverse event.

A common means of reducing error is to look for technological solutions rather than solutions that are more susceptible to human error. One example would be electronic prescription software. The system can be engineered to require a provider to acknowledge and override problems, such as drug allergies or interactions, in the medication order prior to submitting it to the pharmacy with a flag for pharmacist's review. One such system reduced serious medication errors some 55% (Opus Communications, 1999). While civilian institutions are considering the $1.9 million to install computer systems against the estimated $5-10 million saved each year, military medicine is already using an active computer-based prescription program and has presumably reaped some benefit with reduced errors due to written prescription illegibility and other problems faced by civilian doctors and pharmacies. However, military processes should be reviewed to assure that the technology is maximized to minimize errors when possible.

An unintended consequence of reliance on technological solutions over process improvements is an unintentional reinforcement of the idea that one can have enough technical knowledge to

make patient safety error obsolete. Examples of this idea are seen when organizations prefer use of a sophisticated training dummy to teach problem solving over development and use of a checklist to enable error management. Both are important measures that work together to create a provider with increased knowledge and a process that decreases the risk of error. As Reason points out, increased technology does little to increase individuals' personal beliefs or an organization's culture of safety.

Foundationally, technical knowledge is rarely the cause of error, rather failed integration of the health care team via poor communication and teamwork skills, personality errors causing poor teamwork (arrogance, authoritarianism), and errors generated by simple human limitations (fatigue, hunger, etc) as the IOM report attributed to human error. A cultural failure to identify human error risk in medical operations already exists. Health care providers "seem to deny the effect of stress and fatigue on performance," with one study showing that one-third of survey respondents did not acknowledge they make errors (Sexton, Thomas, & Helmeich, March 2000).

Thus we may be reinforcing to health care providers that one can learn enough to stop making simple human errors….this idea is a total fallacy. While research has suggested that many medication errors could be prevented if providers had more information regarding the drugs used, it is becoming an impossible task to know everything about the numerous drugs currently available and their myriad of interactions (Opus Communications, 1999). This may lead patient safety advocates to ask what improvements can be easily made. Human factors and error prevention training, as well as efforts to improve processes used regularly in medicine, has already begun to change these flawed perspectives.

Process improvements, such as standardization and simplification, can be an inexpensive, effective way to reduce errors. However, they are easy to inconsistently apply, especially in the

absence of strong leadership reinforcing the importance of these improvements. The idea behind process improvement generates from the notion of conscious and subconscious action. A student driver uses a great deal of conscious thinking to actively monitor the car's progress, the traffic signals he should obey, and objects surrounding him, such pedestrians and other traffic. In many cases, the student driver makes errors as a result of his brain becoming overwhelmed by the new stimuli and unable to process the information quickly or effectively. After some time, his thinking becomes automatic, and he develops into a driver that can commute home with no memory of the drive at all. In this case, his errors would result from subconscious thinking and his own failure to recognize that the environment or situation had changed such as when he needed to pick up a gallon of milk on his drive home but forgot. Errors in automatic thinking are often called slips, and errors in conscious thinking are often called mistakes (Wachter, 2008).

Understanding conscious and automatic behavior has led to process improvements in medical care. As a result, fewer insurance claims have been made in overall claims, obstetrics, emergency room, and high-risk areas-- such as surgical services-- because of effective time-outs and other process improvements (Agency for Healthcare Research and Quality, 2010). Unfortunately, identifying which processes require improvement can be challenging without effectively identifying trends in reported patient safety events.

Both civilian and military medical providers are working toward the development of standardized event databases to collect and analyze both near adverse events and harm incidents at the corporate level. While an electronic event reports database has been in use through TJC for some time, reports pulled from that database are qualified with the statement: "The reporting of most sentinel events to The Joint Commission is voluntary and represents only a small proportion of actual events. Therefore, these root cause data are not an epidemiologic data set and no

conclusions should be drawn about the actual relative frequency of root causes or trends in root causes over time" (The Joint Commission). At the time of the IOM report, few states are currently able to aggregate their data or analyze them to identify general trends due to lack of resources or limited data from reports received (Kohn, Corrigan, & Donaldson, 2000). In the decade since the report's release, much of the trend analysis available in the literature stems from insurance companies, also acknowledged as the purchasers of medical care, or researchers.

Military efforts toward developing a standardized event database are only recently being realized. Training for investigators to use a standardized database has recently begun within the last four months at bases selected for a pilot study (White, 2011). Called the Patient Safety Reporting (PSR) database, the intent is to "provide facilities with meaningful and useful data to identify safe practices, to mitigate potential risks and hazards and to improve clinical outcomes" (DoD Patient Safety Program, 2010). Currently, approximately 10 bases have begun implementation of the program across the DoD (DoD Patient Safety Program, 2010). The program is designed to automate non-standardized paper programs, allows for anonymous reporting while maintaining report security. Unfortunately, the severity categories selected for use in this program are reversed from those used by DoD Safety communities, leading to confusion in non-medical leaders during discussions of events or trends. Additionally, it will be some time before the system is robust and populated with the data it is designed to support.

The limited accessibility of information currently available via standardized database provides little for trainers and program managers to use to focus their patient safety improvement efforts. TJC's national patient safety goals change little from year to year and may not be applicable to the causes of events seen within military organizations. However, experts in trend analysis are already assigned in both medical and safety military organizations and can provide a necessary

objective perspective on the applicability of national goals and civilian patient safety trends to military medicine events reported.

Yet the assumption that civilian and military medicine's patient safety concerns parallel continues. In 2007, TJC's national patient safety goals focused on communication and information errors, yet a trend analysis of reported events within a small MTF showed the most frequently occurring errors resulted from training processes (Hancock, Sayles, & Peters, March 2008). Whether this difference results from a civilian health care delivery system that is more heavily fragmented or heavy reliance on skewed data that results from voluntary reporting at either organization cannot be answered. Obviously, the development of standardized report databases can and should be used to inform future efforts to strengthen patient safety programs. Advocates must ensure that the problems being addressed are actual concerns of the health care organization and not a knee-jerk reaction to what has been identified nationally. Being fiscally or professionally irresponsible in spending resources for a problem that exists in civilian medical organizations but is less problematic for military MTFs is the risk in failing to properly analyze trends.

Interim to a robust database of military patient safety events, military patient safety advocates must continue to direct their efforts at the problems identified by TJC despite a potential for focusing on the wrong trends. Recent event data correlates with previous findings that one of the primary adverse event causes is communication, which relates to several TJC national patient safety goals, likely because of the fractured nature of civilian health care (Agency for Healthcare Research and Quality, 2010). These were likely selected by TJC because harm events and close calls serve as predictors of claims activity and thus can be used to quantify a trend (Agency for Healthcare Research and Quality, 2010). Because military medical providers should have less

liability concerns than a standard institution, the question should be asked if civilian and military patient safety programs are as interchangeable as they are currently viewed.

Clearly, thorough investigations must occur to build the necessary reports databases that are needed to assure adequate prevention training. The process for opening and closing a RCA investigation is defined by AFI as well as some portions of the investigative process. However, a great deal of the investigative process relies on expert clinicians who may not have investigative expertise. There is no formal training course for medical event investigators in the civilian or military medical communities recommended by TJC or provided via the USAF Safety Center. Civilian education institutions have certification programs, but they are not required prior to participating in an RCA; no training is specifically required. Any training or awareness on how to accomplish these investigations may be gathered via experience or aided by review of the literature available on the subject. Additionally, report quality may be affected by limited time available to reviewers at the hospital and MAJCOM levels to assure quality in a final investigation.

As previously discussed, the patient safety committee appoints an investigator, performs quality control on a report prior to sending it to the MTF Commander and MAJCOM for review, and presents lessons learned to the MTF Commander and Executive Committee. This patient safety committee and any appointed investigators are selected from the medical personnel assigned to the MTF Commander. Medical investigation reports are reviewed at the MAJCOM level, but visibility on investigation findings and methods to prevent future occurrences could be increased within the event MTF and MAJCOM. Information may be passed at various professional staff meetings per the MTF leadership's guidance. Reports are not currently required to be briefed to all personnel or all providers.

In slight contrast, USAF Safety programs have a strong, well-trained investigator pool. Investigations are accomplished by investigators independent of the mishap organization's chain of command rather than one who works within the organization. Additionally, there is a robust review process at the MAJCOM and Headquarters level and common use of a standardized database that can serve as a reference to supplement any training. Also, USAF Safety investigators have a vital legal ability to offer privilege. Personnel testifying before a safety board may provide potentially incriminating evidence without fear of repercussions in the interest of preventing future similar events (Air Force Instruction 91-204, 24 September 2008). Reviews result in a newsletter, called the Blue Four News, released from the AF Safety Center containing heavily sanitized mishap summaries intended to improve safety in operations.

Finally, Aviation and Ground Safety mishaps are commonly reviewed for human factors trends. Interestingly, this trend analysis by medical human factors experts are required annually by AFI 48-101, an Aeromedical Instruction, but no similar requirement exists to accomplish human factors reviews of patient safety events. Human factors analysis of patient safety events occur on an ad-hoc basis as a result of an MTF Commander's request. Rarely, does information from this type of trend analysis get presented to an MTF Executive Committee, so it is unlikely to have been used to improve training provided to reduce human error.

This does not mean that the MTF Executive Committee does not hear any patient safety trend information. AF instructions do mandate that the Risk Manager will brief the MTF/CC and Executive Staff on MTF medical malpractice claims semi-annually as well as discuss lessons learned, systemic problems, and incorporated this information into patient safety, performance improvement and risk management activities (Air Force Instruction 44-119, 24 September 2007).

It is difficult to find data quantifying if this integration occurs effectively in military medicine. One study found that after a nine month quality improvement effort, changes based on medical innovations were implemented less than 9% in other units of studied hospitals and only 2% of the time in other regional hospitals (Mills, Weeks, & Surott-Kimberly, Mar 2003). Most significantly, after 12 months there was no implementation in participating hospitals leading investigators to recommend a personal commitment from senior leadership, dissemination strategies that push information to clinicians, and monitoring of progress at the regional level are all needed for dissemination of complex medical information to occur (Mills, Weeks, & Surott-Kimberly, Mar 2003).

Data from investigations and lessons learned are the key to ensuring that mandated TeamSTEPPS training is maximized. Currently, each incoming member to a medical group is required to complete a one-time TeamSTEPPS training session. Refresher training occurs within duty sections, work groups, or clinics as supervisors see fit. By AFI, each MTF is required to conduct training annually based on the individual needs of the clinic or MTF and should be provided to multi-disciplinary teams to ensure their increased efforts toward collaboration and communication (Air Force Instruction 44-119, 24 September 2007).

Based on quality of care and patient safety successes from this training seen in the Defense Department, a TeamSTEPPS National Implementation program was begun in coordination with Dept of Health and Human Services to bring infrastructure for team-based care training (Department of Defense, 2009). Thus far, successes have been noted. One study of four civilian hospitals demonstrated an estimated reduction of 1000 injuries by providing TeamSTEPPS training to obstetrical care providers, resulting in 10-15 fewer lawsuits (Agency for Healthcare Research and Quality, 2010).

There is no doubt that team-based care training, such as TeamSTEPPs, is effective. This training provides a foundation in human error prevention for common health care settings. Despite successes, this training could be improved using recent adverse event data in order to maintain progress in patient safety improvements. A single exposure to this training or multiple exposures to the same, unchanging curriculum may not be sufficient to improve patient care in the long term.

To validate completion of the AFI requirements to provide training, MAJCOMs have tracked training numbers through the one-time training and some MAJCOMs have required reporting on which "tools" were used while providing medical care. In this case, tools are the particular skills taught within the TeamSTEPPS training such as time-outs, briefs, debriefs and the like. Summary information on tool use or other improvement/implementation data from the MAJCOM is not presented in many MTFs.

Newsletters available from TJC and information available at the DoD Patient Safety Program website provide similar data, but no requirement exists to ensure their distribution or inclusion into current training. Additionally, the lessons learned presented to the MTF Executive Committee contains useful information to supplement team training. There is no MAJCOM level database of local updates to the TeamSTEPPS curriculum or sanitized newsletters, like the AF Safety Center's Blue Four news, generated to support increased training quality. Lessons learned from investigations, common tools used, or ways to increase a culture of safety from data collected at the MAJCOM level is not typically provided to the MTF (White, 2011). It appears that changes to training curriculum, if they occur, do so at the discretion of the MTF, Group, or Squadron Commander. This discussion begs the question; Are we doing the best we can in preventing future errors in patient care?

III. Comparing Alternative Methods to the Status Quo

As one article points out, increased awareness and research in patient safety may or may not translate into better patient care (Stelfox, Palmisani, Scurlock, Orav, & Bates, June 2006). Correctly, the necessary increased awareness from the IOM report has spurred efforts toward making a medical facility a safer place for patients. However, there is still work to be done. In the five years after the IOM report, few hospitals reached the IOM goal of reducing mistakes by half (Morrissey, Nov 2004).

No journals could be located with reported updates with the scale of reporting seen in the IOM report since Morrissey's 2004 article. Specialties within medicine have reported their own progress or failure to effectively improve patient safety, but a thorough review was not found nor have any published results achieved the recognition level seen with the IOM report. A meta-analysis of the literature reporting the various specialties' failures and successes to develop an overall update on progress is outside the scope of this paper. Regardless of the progress seen thus far, there are still several additional actions that military medicine can, and should, take in order to ensure safer patient care. These actions remain valid regardless of whether civilian medicine has improved their patient safety rates because of the military's structure and organizational differences from civilian medicine, as previously discussed.

Organizational emphasis on lessons learned as gathered from a robust database of investigations generated by voluntary reporting and trigger analysis would improve patient safety efforts. Additionally, investigations should be completed by independent investigators and reviewed for quality by MAJCOM level decision-makers and integrated into existing training. This section will identify several aspects of improving current patient safety efforts: improving

patient safety investigations, communicating the right lessons, building a zero tolerance accountability culture, and suggesting a new model for safety in the US military.

First, investigations can be developed into a more robust system using measures already validated within the military safety framework and by maximizing the technology already in place in military medicine. Military safety investigations are distinctly separate from legal or fault-finding investigations. They are strictly described in terms of scope, convening authority, and investigative process (Air Force Instruction 91-204, 24 September 2008). Upon initiating an investigation, investigators work solely for the convening authority during the 30 day duration of the investigation and each clearly defined mishap category has established guidelines for whether the MAJCOM or local wing serves as the convening authority (Air Force Instruction 91-204, 24 September 2008).

By AFI, the convening authority determines the "depth of investigative effort" required to sufficiently investigate a mishap and assures that investigators who have no personal interest in the investigation, are able to act impartially, and are selected from outside the mishap unit whenever possible (Air Force Instruction 91-204, 24 September 2008). Presumably, this is done to assure impartiality of investigators. Investigators' impartiality may be tested when they investigate a mishap that occurred in a hospital or clinic where they work daily or someone in their rating chain of command is effectively the convening authority for their investigation.

Additionally, the concept of privilege applied to safety investigations aids in developing a thorough picture of the fault chain resulting in the mishap under investigation. It was not clear during research for this paper if safety privilege as applied to traditional DoD Safety disciplines would hold under legal challenge during medical patient safety investigation. However, it is an area for future research given the immense improvement in an investigation's thoroughness that

could be obtained. Privilege requires strict adherence to non-release of information per AFI and the UCMJ (Air Force Instruction 91-204, 24 September 2008). This attitude is already fairly consistent with requirements for handling patient medical information under Federal patient privacy laws.

In many cases, very few identifying details are needed to provide institutional lessons learned from an investigation. Often, discussion of the chain of events that allowed an adverse event to occur can serve to sufficiently improve training. It seems that few medical personnel are aware of how little identifying information about an adverse event is necessary to improve training. Investigators may not realize that privilege could aid an investigation. Perhaps requests for legal interpretations regarding if privilege applies to military medical investigations have rarely, if ever, been made because of the limited military investigative background of the medical personnel accomplishing the investigations. For most, they may be experienced in Root Cause Analysis (RCA), but few may have served as a medical member on a Safety Investigation Board (SIB), the USAF Safety investigative model. As a result, they may be unfamiliar with the provisions under DoD Safety guidance and have simply never asked their legal consultants if rights extended under DoD policy extend to patient safety investigations.

In making a MAJCOM the convening authority for a SIB, AFI guidance has minimized conflict of interest and increased the possibility of a thorough and unbiased investigation that reviews organizational-level system failures, not simply issues directly relating to the current investigation. With a MAJCOM-level convening authority, report quality is also increased by two additional factors: power to enforce recommendations resulting from the investigative process and the ability to review reports for adequate thoroughness in the investigation itself. Recommendations are defined as "feasible and effective solutions to eliminate identified hazards,

or if the hazard cannot be eliminated, to mitigate the hazard's potential consequences" (Air Force Instruction 91-204, 24 September 2008). In communicating recommendations to the convening authority, a SIB reinforces the MAJCOM's role in assuring operations occur safely and effectively. This fact is magnified when a SIB is required to brief a convening authority on their findings or simply submit their report for MAJCOM review. Medical investigations of sentinel events are significantly less visible, though they already have a similar review structure in place.

Another significant change to patient safety investigations requires shifting from reliance on voluntary reports. This shift has already begun in AFI-mandated peer review process. Defined as an objective review of the quality of care and practice of a provider, the intent is to look reactively at a provider's patient care by reviewing a percentage of their patient records and assess how closely it meets accepted standards of care (Air Force Instruction 44-119, 24 September 2007). Based on peer review findings, proactive measures may be taken to ensure the provider's future patient care is not compromised. The peer review process is man-power intensive, requiring a provider with the same AFSC and higher level of training completes these reviews for 5% of a providers' patient and submits their findings to the Chief of Medical Staff (Air Force Instruction 44-119, 24 September 2007). Additionally, the provider and department must receive review feedback and may require retraining as appropriate (Air Force Instruction 44-119, 24 September 2007). In the case of specialty clinics with a single provider, records can be reviewed by a provider at another MTF. This adds another layer of communication and other barriers that may add complexity to patient safety improvement efforts.

To increase redundancy and the probability of finding errors in this system, technology could be leveraged. Civilian facilities have identified common circumstances surrounding adverse events and developed trigger tools, such as a trigger list. Using trigger tools, medical personnel

responsible for transcribing and coding medical records can provide a brief, additional review. For example, prescription of a medication followed by antihistamine would be triggered as a potential allergic reaction. Investigators could then determine if the provider could or should have been aware that the reaction was likely.

In military medicine, contract coding personnel could send a report, or the record itself, to the Patient Safety Manager for entry into the Patient Safety Reporting database for investigator assignment, follow-up, and tracking. In this case, leveraging personnel that are already contracted to complete a task who do not have a personal stake in reporting would increase the pool of information needed to generate an accurate picture of events as they occur in the MTF without increasing the workload of already over-tasked providers. Records requiring review could be identified using a trigger list of diagnostic codes typical to high-risk or high-cost adverse events.

Another way of leveraging technology is to maximize data already within computerized medical records. In this case, military medicine has already developed technology enabling electronic records systems which reduce some forms of medical errors. Ensuring that existing systems require preview provider inputs for medication interactions and/or drive acknowledgement of potential interactions would further reduce medication errors. Additionally, revising the medical records system to move beyond simply enabling a free text word search by a Patient Safety Manager and automatically scanning free text based on trigger tools would significantly increase visibility on adverse events within the MTF.

Any of these technological advances would generate additional work in separating the necessary information from the unpreventable adverse reactions, such as separating a truly unanticipated allergic reaction from one in a patient known to be allergic. However, it is preferable to have a large pool of information on possible adverse reactions requiring review than

to lack a full picture of what adverse events could be occurring because they are not reported voluntarily. It is very important to note these trigger tools can identify and prevent medical errors that incident reporting systems and humans are likely miss (Wachter, 2008).

Second, current mandatory training should be supplemented with lessons learned data. Communicating investigation lessons learned to medical personnel cannot be assured under the current program constraints. The importance of team skills training and the requirement for this training to occur in the MTF has already been discussed. Ensuring this training affects cultural change may be hindered by limited required training frequency, though required tool reporting already discussed provides a needed additional emphasis.

However, training can be improved by the addition of local examples and findings from recent investigations. Currently, the training consists of a multimedia presentation of skills, using exercises and scenarios to practice and emphasize skill use. Additionally, there is a video of a nationally famous patient safety advocates' story used as an introductory icebreaker. This is often the most emotionally charged portion of the class and commonly receives the most student participation in instructor questions. This is the only real adverse event story written into the curriculum.

The program intent may have been to have instructors with extensive clinical experience who could add their own personal near miss accounts. Given the cultural restraints discussed earlier, intent like this seems a poor estimation of how this community is likely to behave. Within medical operations, it is more common to provide these instructor duties to personnel least capable of instituting change, perhaps nurses or technicians, because other personnel are needed to ensure the clinic continues patient care. Additionally, within mandatory military programs, it is common to assign a person of mid-level rank to fill a tasking such as TeamSTEPPS Instructor,

because of the need for an experienced person but not someone who is vital to operations. Typically, volunteers due to interest in the program are difficult to find. Non-volunteer instructors may not be motivated to instruct well or bring their own experiences, if they have any, to their classes. As a result, skeptical team members are most likely to be instructed by someone they are least likely to listen to, which severely limits their learning and eventual program compliance. Leaders should assess if their instructors are the most likely to produce the change they desire.

The development of a standardized patient safety reports database can aid instructors who look to drive culture change or feel they are disregarded by their audience. By adding information such as local trend analysis and lessons learned from investigations in the database would significantly improve the instruction is already provided. Critics of TeamSTEPPS training may feel their time has been better spent if they understand their training addresses problems actually occurring in their MTF. However, the usefulness of such a database is heavily limited if the investigations are not thorough and well-developed. The ten-year old adverse event story and limited research data written into the curriculum is minimally sufficient to inspire belief in the TeamSTEPPS curriculum or significantly change behavior. Would it be more effective to require classes are instructed by doctors, who often lead medical teams, by human factors experts, who are also medical personnel, or simply by actual volunteers, who are willing to put additional time and effort into curriculum improvement? Recent results from the USAF Safety Center's Airman to Airman, or A2A, indicated that the most effective way to provide training for 18-26 year old members is to effectively leverage mishap events and real-world repercussions over simply providing Power Point training (USAF Safety Center, 2010).

All of these cultural and limiting factors underscore why it is so important to provide supplemental lessons learned from an investigation to all members of the MTF outside of TeamSTEPPS training. First, it communicates that leadership values the training and reinforces the cultural change that should be underway. Second, it provides an example of how the organization could have used their knowledge, experience, and skills to accomplish better care. Last, it becomes subject material for future instructional classes and impetus for individual providers and clinic leaders to improve their care.

One hindrance is that providers may not recognize their own limitations or understand how a mistake might be made. People often disregard others, even other professionals, who have made mistakes as being unprofessional or unintelligent. Typically, this is far from the case. An example can be seen in a recent wrong site surgery in which the surgeon operated on the wrong hand (Aleccia, 2011). Providers who do not understand human factors may not understand how another provider could make the mistake. Because of this failed understanding and belief in their own infallibility, they may perceive that they are not susceptible to making the same mistake in the future.

Review of lessons learned can illustrate the scope of the problem, as well as provide options for preventing future events. A skilled TeamSTEPPS instructor or MTF leader could use details from the case to illustrate that the mistake could happen to anyone. In this case, distractions that interfered with the surgeon's performance of routine tasks included an ineffective inpatient consult, a previous patient's needs, the event patient's inability to speak English, surgery suite and personnel changes just prior to the operation, and the perception that time was constrained (Ring, Herndon, & Meyer, 11 Nov 2010). Several TeamSTEPPS tools, such as huddles, call-outs, and checklist use could have minimized or prevented this error.

Yet, there are several reasons why MTF leadership may not want to provide lessons learned for a recent local investigation to the entire staff. Obviously, there is potential for medical personnel to identify details about a patient's care that falls into unprofessional or illegal disclosure parameters. Patient information may become the subject of gossip or released to inappropriate personnel as a result and failure to adhere to patient privacy laws may intentionally, or unintentionally, result. Sharing lessons learned in an open forum may reduce morale because of the impact on an individual's pride or reduce teamwork because of co-workers' lost respect for a provider that made a mistake. Last, it may identify a scope of problems within the organization that they do not want publicly acknowledged.

Because of these factors, it may be more effective for a MAJCOM to provide lessons learned in a sanitized format. This will more effectively communicate senior leadership's involvement and emphasis on the program, takes the decision from the hands of the MTF Commander, and reduces perception regarding hidden information. A quarterly newsletter with significantly redacted investigation details focusing on lessons learned might be ideal to improve the training occurring in TeamSTEPPS without sacrificing patient privacy concerns. A newsletter would easily serve as an important resource for instructors interested in improving the quality of their instruction.

Critics of a newsletter may argue that the new database under construction renders this idea unnecessary. However, without a newsletter, the Patient Safety Manager must assess if TeamSTEPPS instructors should have access to the database or regularly execute searches to add mishap information to assure they are providing quality instruction. This may limit an already small instructor pool. Leadership emphasis in communicating these concerns to the entire MTF is compromised. New information on lessons learned would only be received by the one-time

attendance during TeamSTEPPS or a motivated section training monitor who requested the information. Reliance on single instructors to find and incorporate lessons learned information is not sufficient to work systemically to build a culture of safety and efficiency.

A great deal of action must occur by senior leadership and patient safety advocates to drive the cultural changes needed in an effective patient safety program (Mills, Weeks, & Surott-Kimberly, Mar 2003). Newsletters emphasizing patient safety, MAJCOM or AF-level reading lists of patient safety and quality improvement materials, or requiring regular meetings at the clinic or specialty level to discuss lessons learned would communicate senior leaders' commitment to patient safety. These actions would begin to create a culture change.

There is more benefit to holding regular meetings than simply emphasizing patient safety. Military aviation already uses this technique in their safety briefings to emphasize a willingness to admit mistakes, admit that humans are fallible, and allows others to learn from their actions. Similar gains could easily been seen within military medicine. Military medicine should develop a culture stressing zero tolerance for failed accountability for mistakes. Currently, this culture may be presumed but is not discussed or expressly written or stated. Many of the actions previously discussed would be effective in development of a zero tolerance accountability culture.

Another clear indicator of a zero tolerance accountability culture is one that identifies its problems within the community. The Chief of Staff Safety slides provide an update on current mishap rates and trends and are provided weekly throughout the USAF. A similar trend analysis and review of key lessons learned provided from the MTF or MAJCOM staff would serve to illustrate the ideas that mishaps should be reported so that lessons can be learned to prevent future events.

Failure to complete a periodic trend analysis severely limits a proactive safety program. Current patient safety programs risk missing significant issues because adverse events may be individually reported at a quarterly meeting but fail to be recognized as part of a more significant group or trend. Experts in trend analysis, both in epidemiology and human factors, are already assigned at both the wing and MAJCOM level. Their expertise should be leveraged to provide this necessary review of events to assess that patient safety efforts are correctly targeted. Trend analysis further aids leaders in assuring that MTF efforts to improve patient safety are effective.

Finally, the need for new models in patient safety must be examined. Any comparison of patient safety improvements would be incomplete without review of program ownership. Two potential models are worthy of discussion: combining medical safety into the military safety program and combining both patient safety and military safety under a new directorate with the Inspector General.

There are two aspects of combining medical safety with military safety programs. The first is relatively simple. It involves bringing some of the clearly defined and effective methods already used in military safety into existing patient safety programs. More challenging but worthy of consideration, direct assignment of patient safety investigations and prevention programs under military safety in the USAF Safety Center is also possible.

A significant movement of manpower is necessary to support such realignment. This is particularly relevant as both safety and medical military professionals are usually considerably undermanned. Patient privacy information may also make a move of this scale prohibitive. Congressional limitations regarding Defense Health Program appropriated funding and legal right to command under the UCMJ may further constrain the integration of these disciplines.

Another factor is Safety leaders who may lack understanding regarding reasonable recommendations or valid recommendations from a given medical investigation. However, a realignment of these disciplines would ensure objectivity in investigations, would ensure standardized database use, use of a higher headquarters convening authority, accessibility of investigation findings, recommendations, and lessons learned as well as regular trend analysis. Finally, investigator training could be established or expanded to ensure that medical investigators are equipped to complete a thorough, standardized investigation.

One radical notion is that of combining Inspector General and Safety functions. In effect, this provides the USAF the capability to ensure recommendations made as a result of safety investigations are enforced. It would truly put "Safety First", a mantra long heard in USAF operations. Cost and efficiency savings may be found in enabling a single section to enforce mission compliance while maintaining a safety-first focus. Also, it may ease manning constraints in branches each suffering from limited manning. A June 2006 FAA circular on Safety Management Systems identified the need to combine safety efforts into the normal business framework of today's current complex operating systems. While the circular referenced aircraft management systems, the idea that internal quality and evaluation processes should result in continuous improvement of operational processes should not be held for the aviation community.

Clearly, such a move would require a significant cost and time expenditure. The strength of such an organization is the ability to make policy based on investigative data rather than defer decision-making to the appropriate level within the chain of command. This may become problematic in combining two organizations already empowered with a great deal of ability to require a commander to act and may be perceived as hindering commander authority. This

concept requires careful consideration and assessment to assure the suitability of such a drastic measure.

IV. Ways Forward (Recommendations and Conclusions)

Patient Safety can be made better. This paper has identified several recommendations to improve existing programs. For convenience, these recommendations are listed in Table 1 along with a ranking of general estimated cost required to implement these recommendations.

While minimal efforts were placed into estimating costs, they are included simply to illustrate that several low-cost, high-impact program revisions can be undertaken to improve patient safety programs. It is not within the scope of this paper or the author's authority to fully analyze the costs associated to implement these improvements. Additionally, other factors outside the author's awareness or control may make these improvements infeasible.

In some cases, it is impossible to give a full cost estimate. For example, use of independent, trained investigators varies within military safety based on the convening authority to use an investigator who is outside of the mishap unit and capable of being objective or selecting an investigator who must travel to the mishap location as a temporary duty. In the case of military medicine, these costs could be reduced by using personnel involved with the patient safety program at the MAJCOM to provide quality control reviews of the submitted reports to assure that selected patient safety investigators remain objective and complete a thorough investigation.

The extension of privilege to medical investigations is also well outside the scope of this paper. A thorough review of the costs of implementing this recommendation is impossible to gather without consult to USAF medical legal professionals. Also, cost assessment would likely be affected by case particulars, which is commonly seen in military safety investigations. In the

context of this paper, it is simply presented as an addition recommendation for senior leaders to consider for further review.

Category	Recommendation	Cost Rank (1 = lowest, 3 = highest)
I. Improve Investigations	Independent , trained investigators	Situationally Dependent, probable 2
	Privilege extended to patient safety investigations	Situationally Dependent, probable 2
	MAJCOM convening authority for investigations	1
	Technology: Free text searches for triggers in electronic records	1
	Technology: Coders/transcriptionists review for triggers during their process	2
II. Communicate Lessons	Change Instructor requirements (Doctors, Human Factors experts, volunteers)	1
	MTF requires trend data, lessons learned integrated into TeamSTEPPS	1
	MTF regularly releases information on investigations lessons learned to all in MTF	1
	MAJCOM provides lessons learned newsletters and/or recommended reading lists	1
III. Build Zero Tolerance Culture	Roll Calls/Safety Briefs emphasizing mistake accountability & error prevention	1
	Trend Analysis	1
	Implement other measures to emphasize leadership commitment to patient safety	1
IV. Assess New Models	Use aspects of military safety to improve current patient safety program	1
	Fully integrate patient safety into military safety program	2
	Create new directorate combining Inspector General and Safety functions	3

Table 1. Recommendations and Cost Rank

Category I of Table I lists recommends improvements in investigations. While adverse event investigations already occur, gains in information clarity and thoroughness could be seen if independent investigators, privilege, and MAJCOM convening authority from military safety programs were applied. Technology can also be leveraged to provide perspective on adverse events that occur within the MTF due to reliance on voluntary reporting and quality peer review. Using additional technological redundancies to find and investigate errors would provide data for senior leaders to validate that quality patient care occurs throughout the organization. Presumably, it may increase patient satisfaction and aid in identifying areas to increase efficiency efforts. With regard to cost, few of these measures are likely to be cost-prohibitive. The greatest sustained cost is likely to come from the rewriting and maintenance of contracts held by coders or transcriptionists. Research would be required to determine if these increases are effectively offset by efficiency and other gains.

Table I's Category II details methods by which lessons learned could be more effectively communicated across the MTF. Consideration should be paid to the instructor requirements for TeamSTEPPS and other patient safety training. This change would cost nothing to implement other than the time of the members required. Similarly, requiring inclusion of new trend or investigation data and educating MTF personnel on recent investigations should be another low-cost improvement measure. Care must be taken to assure this information is distributed in the correct forum. Finally, the MAJCOM can make gains in improving medical personnel have awareness of lessons learned by emphasizing patient safety via newsletter and recommended reading lists. While this recommendation will require work by some MAJCOM-level staff, there are members already accomplishing patient safety related tasks.

Category III of Table I, while containing few specific recommendations, seeks to stress the importance of senior leaders requiring a culture of safe, quality patient care and consistently emphasizing it. Roll calls and safety meetings have been successful in driving his change in other communities and also work to build morale while costing very little to implement.

Finally, Category IV of Table I outlines three new models of patient safety. Simply combining aspects of current military safety programs to improve the existing patient safety framework is the lowest cost measure. Many components of this recommendation are integrated in previous categories, and no additional discussion should be necessary. Fully integrating patient safety into military safety programs is a slightly radical idea. It would require buy-in and commitment from multiple USAF agencies, not the least of which is cost to implement and sustain such a program. Finally, the development of a new directorate combining Inspector General and Safety functions could be developed. The cost alone to such a function may seem prohibitive. However, with limited manning and agencies accustomed to regular manning shortfalls, there may be unexpected gains to consider. Certainly, the alignment of inspection criteria with investigation findings should be a factor for consideration.

In the end, we must recognize that more action can be taken to improve patient safety. Using safety processes already in place in the military safety community would easily enable identification of lessons learned and improve the quality of training in prevent event recurrences.

The question is not can we afford to continue the changes begun as a result of the 1999 IOM report. The question is have we done enough to truly make those changes part of our culture.

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